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CAUSES OF RECORDING ERRORS IN SINGING BIRD SURVEYS

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It is well known that in singing bird surveys, even the best surveyors seldom record all of the audible birds (Robbins and Stallcup 1981). This is especially true when there is a pronounced "dawn chorus" because so many birds are vocal then (Bystrak 1981). Experimental evidence has demonstrated that even later in the day, 35% of the audible birds may be missed by experienced field workers (Bart and Schoultz 1984). The experiments yielding this result included a series of simulations in which bird songs were broadcast from loudspeakers surrounding the surveyors. The primary purpose of the simulations was to determine how the proportion of birds recorded varies with the number of birds present. Here, the same data set was used to determine what kinds of recording errors were most common.

There has been little study of the kinds of recording errors made by surveyors in singing bird surveys. Variation in hearing ability, and its effect on survey results, has been studied by Cyr (1981), Faanes and Bystrak (1981), and Ramsey and Scott (1981). Robbins and Stallcup (1981) commented on the difficulty of separating some confusing pairs of species, and Kepler and Scott (1981) reported on a training program designed to reduce the incidence of recording errors. None of these studies, however, provided estimates of the frequency of various kinds of recording errors.

In this study three kinds of error were distinguished—over-counting, under-counting, and mis-identification—and their magnitudes among experienced surveyors were estimated for each of eight species of birds. Various hypotheses were then investigated that explain the source of the errors. The purpose of the study was to help field workers increase the accuracy of singing bird surveys.

METHODS

Twenty-seven loudspeakers were used to broadcast bird songs for a series of 3-min periods during which 20 experienced bird surveyors recorded all species and individuals that they heard. The surveyors all had participated in Breeding Bird Surveys (Bystrak 1981) and were familiar with the songs of all of the species. At the time of the trials they had been birding for an average of 18 years (range = 5–33 years).

The 3-min periods during which we broadcast songs were designed to simulate conditions occurring between 07:00 and 10:00 in June in many parts of eastern United States and Canada. The numbers of species, individuals of each species, durations of song, and song volumes were controlled, though some of these factors were allowed to vary, as they do on real surveys. We studied the ability of the surveyors to detect 16 species. Nine of the 16 species occurred at densities of one to four per listening period; seven of them occurred at densities of one or two per listening period.

During each listening period, 20 individual birds of 12 or 13 species sang at least once. A total of 39 species occurred during 54 3-min listening periods. Results from 43 periods were analyzed for this report. The others were training periods or periods in which surveyors recorded species but did not attempt to count individuals of each species. For additional details of the simulations, see Bart and Schoultz (1984).

All analyses in this report are based on eight of the nine species that occurred at densities of one to four: Mourning Dove (*Zenaida macroura*), American Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*), Red-eyed Vireo (*Vireo olivaceus*), Common Yellowthroat (*Geothlypis trichas*), Indigo Bunting (*Passerina cyanea*), Field Sparrow (*Spizella pusilla*), and Song Sparrow (*Melospiza melodia*). Each of these species occurred during 27 of the 43 listening periods. Eastern Wood-Pewees (*Contopus virens*) were eliminated in this analysis because one of the tape recordings included a pewee song that closely resembled a Red-eyed Vireo.

Three types of recording errors were examined: under-counting, over-counting, and mis-identification. Under-counting meant missing some individuals of a species. The under-counting rate was defined as (number of birds missed)/(number present). Over-counting meant recording more individuals of a species than were present when at least one individual of the species was present. The over-counting rate was defined as (number of extra birds recorded)/(number of periods in which the species was present). Mis-identification meant recording one or more individuals of a species that was not present. The mis-identification rate was defined as (number of mis-identifications)/(number of periods in which the species was not present).

For each type of error, an 8 (species) by 20 (observers) matrix was constructed, each cell containing the error rate for one observer and species. Standard errors (SE) for the numbers in each cell were calculated in the following way. Rates of over- and under-counting were strongly related to the number of birds present on the tapes. Consequently, the 27 listening periods with the species present were considered to be a stratified random sample. The 10 periods with one individual present comprised one stratum, the eight periods with two present comprised a second stratum, etc. The periods with the same number of individuals present resemble a systematic sample rather than a random sample as they were designed to exhibit the full range of possible volumes and durations, and, as a result, the variance estimates probably had positive bias. This caused the conclusions to be conservative. The standard errors of mis-identification rates were based on the 16 periods in which the species was absent. These were considered to be a simple random sample. Standard errors of the mean number of each type of recording error for each observer (averaged over all species) and of the mean number of recording errors for each species (averaged over all observers) were calculated using the standard errors from each cell.

Most coefficients of variation (CV) were less than 0.10, indicating that sampling error could safely be ignored in estimating the mean error rates per surveyor or species. The sole exception was that the CV's of the mean mis-identification rates per species averaged about 30% and in a few cases were as high as 70%.

Using the three matrices, I calculated the average rate for each type of error, the range in the error rate among observers, and I attempted to identify factors that influenced the error rates, such as number of individuals of the species present. I then evaluated the null hypothesis that each of the three errors could be attributed solely to the species' average error rate and the surveyor's average error rate plus a random component. Under this model, the predicted error rate for each observer and species is,

$$e_{ij} = \frac{e_{i\cdot} e_{\cdot j}}{e_{\cdot\cdot}} \quad (1)$$

where

e_{ij} = predicted error rate for observer *i* and species *j*
$e_{i.}$ = average error rate for observer *i* for all species
$e_{.j}$ = average error rate for species *j* for all observers
$e_{..}$ = average error rate for all species and observers.

The alternate hypothesis in this test was that observers "discriminate" among species, tending to make more errors than expected for some species and fewer for others. Such discrimination might have occurred for several reasons. For example, a particular surveyor might have been especially familiar with one species due to having studied it intensively. Other causes of discrimination are discussed below. I tested the null hypothesis by counting the number of cells in each matrix in which the deviation between predicted and observed error rates exceeded 2.8 times the standard error of the observed rate. This corresponded approximately to the 0.01 level of significance. There were $20 \times 8 = 160$ cells, and under the null hypothesis the expected number of cells having deviations significant at the 1% level was 1.6.

RESULTS AND DISCUSSION

The average number of birds missed per period (with 20 actually present) was 6.0 (range among surveyors = 4.2–10.8). The average number over-counted was 1.0 (range = 0.2–4.1). The average number mis-identified was 0.6 (range = 0.16–2.1). Among all cases in which birds were "made up" (due either to over-counting or mis-identification) the proportion due to over-counting varied among surveyors from 0.15 to 0.78. Thus some surveyors tended to over-count birds more frequently than they mis-identified them, while for other surveyors the reverse was true.

The number of over-counted birds dropped sharply as the number present increased. The average number over-counted per listening period for all species and observers was 0.24, 0.11, 0.05, and 0.01 as the number of birds present varied from one to four. Thus 24% of the time that one individual of a species was present, observers recorded two or (rarely) more, but when three individuals were present, four or more were recorded only during 5% of the periods.

Many of the mis-identifications could be traced to particular species. One surveyor recorded 21 Vesper Sparrows (*Pooecetes gramineus*) and was clearly mis-identifying Song Sparrows. Another recorded 12 Yellow-breasted Chats (*Icteria virens*), apparently mis-identifying Gray Catbirds (*Dumetella carolinensis*). Both of the surveyors frequently recorded Vesper Sparrows and catbirds correctly. In other cases of mis-identification, it was unclear which species was actually heard. Species with seemingly distinctive songs such as crows and Grasshopper Sparrows (*Ammodramus savannarum*) were mis-recorded fairly often. Mis-identifications thus probably are not caused solely by confusion between species with similar songs.

A few errors recorded as under-counting undoubtedly were actually caused by mis-identification. Thus, if one Song Sparrow was present, and was heard, but was recorded as a Vesper Sparrow, then I would have recorded the Song Sparrow as having been under-counted. If most incidents of under-counting were caused by mis-identification, however, rather than by failing to record the bird at all, then the mis-identification rate would have been approximately equal to the under-counting rate. The two rates actually differed by an order of magnitude, indicating that under-counting generally was caused by failure to record the species rather than by mis-identifying it.

The simple model (equation 1) that the rates of recording errors are determined by the observer's overall ability and the species' overall difficulty was rejected for over-counting and missing birds, but not for mis-identifications (Table 1). Thus, for example, seven surveyors under-counted Mourning Doves at rates that were significantly higher or lower than expected on the basis of the average under-counting rate for the species and surveyor. Mourning Doves were sometimes mis-identified, but none of the surveyors mis-identified this species significantly more or less often than predicted by equation 1. Two surveyors over-counted Mourning Doves at rates significantly different than predicted by equation 1.

All species were discriminated for or against by some observers, and there were only minor differences between species. The surveyors were slightly more consistent with robins and doves than with the other species, but the difference could easily have been caused by sampling error alone.

Observers varied in the degree to which they showed discrimination. All observers discriminated for or against at least one species. Two surveyors showed discrimination in the numbers missed or over-counted with each of the eight species. The general conclusion of this analysis is that over- and under-counting, and mis-identifications for some surveyors, cannot be attributed solely to the surveyor's overall skill and the species' overall difficulty.

Causes of recording errors.—Two explanations for the failure of the null hypothesis were evaluated. Under the "species specialist" hypothesis surveyors are assumed to be more capable of identifying some species than others. They miss fewer, over-count fewer, and mis-identify fewer of the species that they specialize on. Conversely, under the "favoritism" hypothesis, surveyors preferentially record certain species. When they are uncertain about which species is singing or about whether the individual has already been recorded, they are more likely to record certain species than others.

TABLE 1

NUMBER OF SURVEYORS OUT OF 20 WITH SIGNIFICANTLY HIGH OR LOW RATES OF THREE TYPES OF RECORDING ERRORS MADE DURING A SIMULATION OF BIRD SURVEYS[a]

Species	Type of error		
	Under-counting	Mis-identification	Over-counting
Mourning Dove	7	0	2
American Crow	12	0	6
American Robin	6	0	4
Red-eyed Vireo	9	0	7
Common Yellowthroat	10	0	6
Indigo Bunting	8	0	8
Field Sparrow	9	0	7
Song Sparrow	8	0	5

[a] $P < 0.01$ using a t-test.

These explanations are not mutually exclusive, but they do lead to different, and testable, predictions. Under the species specialist hypothesis, if a surveyor is especially capable of identifying a particular species, then the frequencies with which he misses, over-counts, or mis-identifies the species should all be lower than predicted by equation 1, and thus the deviations, observed rate–expected rate, should all be negative. If he is especially poor at identifying the species, then each of the deviations should be positive. Thus, under this hypothesis, all three deviations for each surveyor should have the same sign (apart from sampling error). Consequently, if we select a single species, and construct a bivariate plot of any two of the deviations using the data from all surveyors, then we should find a positive relationship.

The situation is different under the hypothesis that surveyors show favoritism. If a surveyor shows favoritism towards a species—meaning that in the presence of uncertainty he tends to record the favored species—then the frequencies with which he over-counts and mis-identifies the species are greater than predicted by equation 1. The surveyor misses the species less often than predicted, however, because he records it when he would hesitate to write down other species. Thus the deviations for over-counting and mis-identification are positive while the deviation for under-counting is negative. If the surveyor avoids recording the species when uncertain, then the deviations for over-counting and mis-identification are negative while the deviation for under-counting is positive. Under the favoritism hypothesis, if we select one species and prepare a bivariate plot of the over-counting and mis-identification deviations we expect to find a positive relationship. If we compare over-counting and under-

TABLE 2

CORRELATION COEFFICIENTS AMONG THREE TYPES OF RECORDING ERRORS MADE BY 20 SURVEYORS IN A TAPE-RECORDED SIMULATION OF EARLY MORNING BIRDSONGS

	Errors		
Species	Over-counting vs mis-identification	Under-counting vs mis-identification	Under-counting vs over-counting
Mourning Dove	0.337	−0.717	−0.378
American Crow	0.481	−0.163	−0.662
American Robin	0.287	−0.309	−0.553
Red-eyed Vireo	0.108	−0.170	−0.580
Common Yellowthroat	0.167	−0.080	−0.547
Indigo Bunting	0.123	−0.383	−0.362
Field Sparrow	0.244	−0.179	−0.414
Song Sparrow	0.100	−0.263	−0.509

counting or mis-identification and under-counting, we expect the correlation to be negative.

Both hypotheses thus predict a positive correlatiion between deviations from the expected rates of over-counting and mis-identification, but the other two correlations (under-counting vs over-counting and over-counting vs mis-identification) are predicted to be positive under the specialist hypothesis and negative under the favoritism hypothesis.

To distinguish between these hypotheses, correlation coefficients were calculated for each pair of deviations from the error rates expected using equation 1. Each species was analyzed separately so each coefficient was based on 20 pairs of observations, one pair for each surveyor. A bivariate plot of each data set was inspected, and the coefficients were calculated both with and without possible outliers. Omitting possible outliers did not change any of the coefficients significantly so all of the data were used in all cases. None of the plots had detectable non-linear trends.

Rates of over-counting and mis-identification were positively correlated for all species as predicted by both the specialist and favoritism hypotheses (Table 2). The deviations between numbers missed and over-counted were negatively correlated in all eight species as were the numbers missed and mis-identified. Both of these trends are predicted by the favoritism hypothesis, but not by the species specialist hypothesis. It thus appears that the variability in recording errors, not explained by the observer's ability and the species' difficulty, is largely due to personal biases for or against particular species. Such biases lead the observer to assign preferentially uncertain cues to certain species rather than to others. The practical im-

TABLE 3

RATIO OF NUMBER OF INDIVIDUAL BIRDS RECORDED TO NUMBER ACTUALLY PRESENT FOR 20 SURVEYORS AND 8 SPECIES OBTAINED FROM A TAPE-RECORDED SIMULATION

Surveyor	Species[a]								Mean
	MODO	AMCR	AMRO	REVI	COYE	INBU	FISP	SOSP	
1	0.61	0.63	0.61	0.61	0.72	0.65	0.70	0.60	0.64
2	0.97	1.33	0.88	0.90	1.05	1.21	1.23	0.65	1.03
3	0.77	0.56	0.65	0.65	0.86	0.72	0.70	0.81	0.71
4	0.75	0.91	0.88	1.07	0.91	1.12	1.18	0.88	0.96
5	0.51	0.75	0.72	0.83	0.86	0.84	0.83	0.65	0.75
6	0.84	1.02	0.75	0.77	0.61	0.72	0.79	0.42	0.74
7	0.49	0.70	0.32	0.53	0.65	0.61	0.74	0.47	0.56
8	0.67	0.97	0.86	0.67	0.70	0.75	0.79	0.54	0.74
9	0.88	0.88	0.51	0.42	0.47	0.47	0.61	0.44	0.59
10	0.68	0.60	0.79	0.75	0.74	0.90	0.79	0.61	0.73
11	0.72	0.75	0.77	1.00	1.09	0.90	0.95	0.97	0.89
12	0.77	0.81	0.75	0.79	0.77	0.79	0.75	0.77	0.78
13	0.61	0.84	0.56	0.77	0.23	0.44	0.90	0.35	0.59
14	0.74	0.81	0.68	0.81	0.79	0.79	0.72	0.58	0.74
15	0.77	0.67	0.75	0.83	1.07	0.84	0.95	0.79	0.83
16	0.70	0.74	0.75	0.70	0.77	0.91	0.77	0.70	0.76
17	0.63	0.67	0.58	0.65	0.49	0.39	0.53	0.56	0.56
18	0.61	0.74	0.75	0.79	0.84	0.93	0.72	0.61	0.75
19	0.90	1.05	0.14	0.49	0.70	0.53	0.88	0.54	0.65
20	0.74	0.83	0.70	0.90	0.61	0.72	0.68	0.58	0.72
Mean	0.72	0.81	0.67	0.75	0.75	0.76	0.81	0.63	0.74

[a] MODO = Mourning Dove; AMCR = American Crow; AMRO = American Robin; REVI = Red-eyed Vireo; COYE = Common Yellowthroat; INBU = Indigo Bunting; FISP = Field Sparrow; SOSP = Song Sparrow.

portance of this result is that surveyors may be able to discern the species they show favoritism towards and adjust their recording practices.

Window species.—Kepler and Scott (1981) reported that in training sessions inexperienced surveyors often missed one or two species at unexpectedly high rates. They referred to these as "window species", the name being derived from the tendency of the surveyor to listen "through" the song, even when it was quite audible. Although the surveyors in the present study were far more experienced than the participants in Kepler and Scott's training sessions, it seemed worthwhile to determine whether there was any evidence of window species in the simulation. For this discussion, the term efficiency is defined as the total number of a species recorded divided by the total number present on the tapes.

The efficiencies for each surveyor and species were calculated and inspected for markedly low values (Table 3). The results showed that there

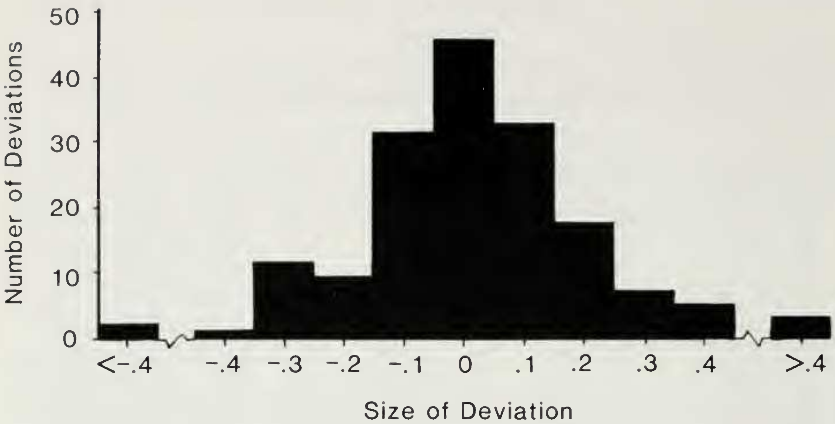

FIG. 1. Frequency distribution of deviations between expected and actual efficiencies for 20 surveyors recording eight species of birds. Expected values calculated using equation 1 (see text). Deviations are expressed as (observed − expected)/expected.

was no strong tendency for this to occur. There are some low values, but markedly high efficiencies—some exceeding 1.0, indicating that, on average, more birds were recorded than were present—were also common.

The occurrence of window species should cause negative skewness in the efficiencies because of the prevalence of very low values. To investigate this possibility, the predicted efficiency for each surveyor and species was calculated using equation 1 with efficiencies rather than error rates. The proportional deviation from the predicted efficiency was then calculated as (observed efficiency − predicted efficiency)/observed efficiency. If window species were important to the surveyors in this study, then the frequency distribution of these proportional deviations should show marked negative skewness. The distribution, however, is almost perfectly symmetric (Fig. 1). Thus, our surveyors had few if any pronounced window species, or if they did tend to listen through some species' songs, such tendencies were only one aspect of a constellation of errors including over-counting and mis-identification as well as under-counting. It should be noted, however, that all of our surveyors had extensive experience with all the species analyzed in this study. If the surveyors had been tested on species with which they were less familiar it is quite possible that window species would have been more evident.

Simultaneous recording.—Surveyors sometimes record together, but independently, to estimate what fraction of the birds present each surveyor has recorded. Two tacit assumptions of this method are that at least one surveyor records every audible bird and that neither surveyor records birds that are not present. The results of this study suggest that both of these assumptions are probably inaccurate to a significant degree, and this makes estimating surveyor accuracy more complex. Most surveyors presumably would like to know both what proportion of the birds they identify correctly, and how often they record birds not actually present. This section presents both theoretical and empirical evidence that simultaneous recording by two surveyors does not produce a highly accurate estimate of the proportion of birds correctly detected. In this discussion no distinction is made between birds that are over-counted and those that are mis-identified. I will refer to both as birds that are "made up."

To consider how well the proportion of birds correctly identified by a surveyor called "one" is estimated, let the correct identification rate = a/b and the estimate of this rate = (a + c)/(b + d − e), where a = number correctly identified by surveyor one; b = total number present; c = number made up by surveyor one; d = number made up by both surveyors; and e = number missed by both surveyors.

The numerator of the estimated rate cannot be smaller than the numerator of the actual rate. If d is smaller than e, then the denominator of the estimate is smaller than the denominator of the actual rate. Thus, if the number of birds mis-identified and over-counted by both surveyors is less than the number missed by both surveyors, then the estimate will be greater than the actual rate. As most surveyors made up only one or two birds per listening period and missed at least four birds per period, it can be predicted that the correct identification rate is usually overestimated when surveyors record in pairs.

This prediction was tested by forming 21 random pairs of surveyors and analyzing the data they obtained in the 43 listening periods. I tallied the number of birds correctly detected, made up, and missed by each observer, and I calculated the actual and estimated correct identification rates for each member of each pair using the formulas above. All but one of the 42 estimates exceeded the actual rate. The average ratio of the estimated rate to the actual rate for all 42 estimates was 1.17 (range = 0.85–1.43). These results pertain to all species combined. The results for species considered separately were similar. The average ratio was also 1.17 (range = 1.06–1.34).

Estimates of a surveyor's correct identification rate varied by up to 0.10 depending on who the second surveyor was. For example, the average of seven estimates for one surveyor was 0.80, (range = 0.79–0.86). The actual proportion correctly detected was 0.69. Thus simultaneous recording by two surveyors should not be viewed as an accurate method of estimating the correct identification rate.

Surveyors are also likely to be interested in estimating how frequently they over-count or mis-identify birds. There does not appear to be any simple analytical way of estimating how many birds are made up when surveyors record in pairs. The most practical remedy is probably to compare records immediately after each listening period and then spend a minute or two attempting to resolve discrepancies. My experience with this practice is that many of the mis-identification and over-counting errors can be identified. The method is less effective in identifying birds missed by both surveyors because when a bird is first heard after the listening period, there is usually no way to determine whether it sang during the listening period.

If some of the birds over-counted or mis-identified can be detected by spending an additional minute or two after the recording interval, then the question arises: should these errors be eliminated in calculating the estimate of the proportion correctly recorded by each surveyor? For example, suppose one surveyor records 10 birds, and the number recorded by both surveyors is 15, but subsequently three of these are discovered to be over-counting errors, all made by the second surveyor. Then should the proportion correctly identified by surveyor one be estimated as 10/15 or 10/12? It might seem that the latter estimate is preferable, but this is not necessarily true because some birds are missed by both surveyors. In fact, as shown below, the former estimate may well be more accurate.

If all the birds made up are eliminated, then the estimate of the correct identification rate presented above becomes a/(b − e). By rearranging the equations, it can be shown that this will be greater than the estimate using all of the records (a + c/b + d − e) if

$$\frac{\text{no. made up by surveyor one}}{\text{no. made up by both surveyors}} < \frac{\text{no. correctly recorded by surveyor one}}{\text{no. correctly recorded by both surveyors}}$$

The term on the left is usually between 0.40 and 0.60 because most surveyors make up about the same number of birds but seldom make the same errors. The term on the right is usually at least 0.8 because most of the birds recorded correctly by one surveyor are also recorded correctly by the other surveyor. Thus the inequality usually holds, and it can therefore be predicted that removing all of the made-up birds will usually increase the estimate of the correct identification rate.

This prediction was tested by further evaluation of the 21 random pairs of surveyors. In the analysis above, the correct identification rate was estimated for each member of each pair using all of the records. The made-up birds were then removed and the estimates were recalculated.

As predicted, removing the made-up birds increased all but two of the 42 estimates. When made-up birds were included, the estimated correct identification rate was, on average, 17% too high. When the made-up birds were eliminated, the rate averaged 24% too high.

Thus, even if one can identify birds that were over-counted or mis-identified, it appears best to use the original counts in estimating the proportion detected correctly. This somewhat paradoxical result indicates simply that paired observations are not a very accurate way of estimating the correct identification rate. Simultaneous observations, however, are an excellent means of uncovering and correcting various other recording errors, especially if the surveyors compare results immediately after each listening period. Furthermore, these cautions apply mainly to the common custom of recording all detectable individuals of all species. If only certain species are recorded or distant songs are excluded, then simultaneous recording can certainly be made to yield accurate estimates of the various recording errors.

SUMMARY

Data from a tape recorder simulation reproducing what is heard on singing bird surveys in June in the northeastern United States were used to estimate the frequency of three types of recording errors. On average, 20 experienced surveyors missed about 30% of 20 birds present on the recordings and made up an average of 1.8 birds/3-min listening period. About one-third of the birds made up were due to mis-identifications; the rest were due to over-counting (e.g., recording three birds when only two were present).

An investigation of the variation in recording errors among surveyors indicated that they tended to discriminate among species, recording some at higher or lower rates than expected on the basis of the species' difficulty and the surveyor's ability. This tendency was referred to as discrimination because the number of individuals recorded was affected by factors other than the species' difficulty and the surveyor's overall ability. Both negative discrimination (recording fewer individuals than expected) and positive discrimination (recording more individuals than expected) were common.

Two hypotheses were investigated to explain discrimination: that the surveyors are species specialists having particularly high ability with some species; and that surveyors show favoritism, tending to record certain species preferentially when there is uncertainty about the true identity of a bird. Analysis of the tape recorder data clearly supported the favoritism hypothesis. The concept of window species, which has been shown in other studies to apply to inexperienced surveyors, had little explanatory power in this study, which used experienced surveyors.

The process in which two surveyors record together, but independently determine which fraction of the birds present each is detecting, over-estimates the proportion of birds correctly identified. Simultaneous recording is effective, however, in revealing birds that were made up, especially if surveyors compare their records immediately after each listening period.

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STUDENT MEMBERSHIP AWARDS FOR 1985

Student Membership Awards in the Wilson Ornithological Society have been made available from the general funds of the society to recognize students who have the potential to make significant contributions to ornithology. The following students have been selected by the Student Membership Committee for awards this year: Jean V. Adams, Bradley Univ.; Terry Armstrong, Queen's Univ.–Ontario; James F. Bergan, Texas Tech. Univ.; Reed Bowman, MacDonald College; Michael W. Brown, Iowa State Univ.; David G. Cook, Texas Tech. Univ.; Thomas I. Crossman, Univ. Connecticut; Clyde D. Cummins, Miami Univ.; Tristan J. G. Davis, Louisiana State Univ.; Barrett A. Garrison, Virginia Polytechnic Institute and State Univ.; Joseph A Gubanyi, Univ. Nebraska; Danny J. Ingold, Mississippi State Univ.; Walter N. Johnson, Univ. Maine; Nedra K. Klein, Louisiana State Univ.; Natasha C. Kline, Univ. Miami; Jacqueline J. Lape, North Carolina State Univ.; David Lemon, Univ. Toledo; Mei-yao C. Louis, Univ. Minnesota–Duluth; Richard W. Lundquist, Univ. Washington; Sarah J. Madsen, Univ. Washington; D. James Mountjoy, Queen's Univ.–Ontario; David C. Morimoto, Boston Univ.; Cecilia M. Riley, Univ. Arkansas; BethAnn Sabo, George Mason Univ.; Virginia M. Scarpino, State Univ. New York–Geneseo; John M. Shipley, Jr., Idaho State Univ.; Douglas G. Sheeley, Texas Tech. Univ.; Stefen Sobkowiak, MacDonald College–Quebec; Kimberley A. With, San Francisco State Univ. Student Membership Committee, Wilson Ornithological Society—Thomas C. Grubb, Charles F. Leck, Roland R. Roth, Richard N. Conner (chair).